IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

ARIOSA DIAGNOSTICS, INC.,

Plaintiff/Counterdefendant,

v.

SEQUENOM, INC.,

Defendant/Counterclaimant.
/

No. C 11-06391 SI

**ORDER GRANTING PLAINTIFF'S MOTION FOR SUMMARY JUDGMENT AND DENYING DEFENDANT'S MOTION FOR SUMMARY JUDGMENT**

Cross-motions for summary judgment by plaintiff/counterdefendant Ariosa Diagnostics, Inc. and defendant/counterclaimant Sequenom, Inc. came on for oral argument on October 11, 2013. Having considered the parties' motion papers, pleadings and arguments, and for good cause shown, the Court GRANTS Ariosa's motion for summary judgment and DENIES Sequenom's motion for summary judgment.

## BACKGROUND

In this declaratory judgment action, plaintiff Ariosa, formerly known as Aria Diagnostics, Inc., seeks a declaration that its non-invasive prenatal test, the Harmony test, using cell-free fetal DNA circulating in the blood of a pregnant woman does not directly infringe or contribute to the infringement of U.S. Patent No. 6,258,540 ("the '540 patent"), licensed by defendant Sequenom.

**1. The '540 Patent**

Sequenom is the exclusive licensee of the '540 patent, which Sequenom licensed from Isis Innovation Limited ("Isis"). *See* Docket No. 37, Tatman Decl. ¶¶ 3-4. The '540 patent is entitled "Non-Invasive Prenatal Diagnosis," and was issued to inventors Yuk-Ming Dennis Lo and James Stephen Wainscoat on July 10, 2001 and assigned to Isis. U.S. Patent No. 6,258,540 The '540 patent relates to prenatal detection methods performed on a maternal serum or plasma sample from a pregnant female, which methods comprise detecting the presence of a paternally inherited nucleic acid of fetal origin in the sample. *Id.* at 2:1-4. "This invention enables non-invasive prenatal diagnosis, including for example sex determination, blood typing and other genotyping, and detection of pre-eclampsia in the mother." *Id.* (Abstract).

According to the patent, conventional pre-natal diagnostic DNA tests such as amniocentesis and chorionic villus sampling involved invasive procedures with risks to the mother and the pregnancy. '540 Patent at 1:12-17; *see also* Docket No. 35, Evans Decl. ¶¶ 34-37. Therefore, non-invasive techniques began to be developed that used maternal blood or serum. '540 Patent at 1:18-20. Prior non-invasive DNA research had focused on detecting fetal cells in a mother's bloodstream, because the presence of cell-free fetal DNA was not known. *Id.* at 1:28-36; *see also* Docket No. 35, Evans Decl. ¶ 21. However, these techniques were time-consuming or required expensive equipment. '540 Patent at 1:36-37; *see also* Docket No. 35, Evans Decl. ¶¶ 39-41 ("Ultimately, neither approach, using fetal cells or the other noninvasive screening measurements described above, has proved sufficiently successful or reliable to replace invasive testing.").

The '540 patent is based on the discovery in 1996-1997 by Drs. Lo and Wainscoat that cell-free fetal DNA (sometimes referred to as "cffDNA") is detectable in maternal serum or plasma samples.[1] '540 Patent at 1:50-51; *see also* Docket No. 35, Evans Decl. ¶ 45. This discovery was important

[1] "Nucleic acid" is the overall name for the class of molecules that includes DNA (deoxyribonucleic acid) and RNA (ribonucleic acid). The significance of the discovery is that the process of isolating fetal cells was not necessary because fetal DNA was present outside of cells, as "extracellular" or "cell-free DNA" suspended in the maternal bloodstream. Docket No. 35, Evans Decl. ¶¶ 53, 57. Blood is made up of cells and plasma (the fluid containing proteins and other molecules in which cells are suspended). *Id.* ¶ 44. Serum is plasma without the clotting proteins (platelets), *i.e.*, blood minus the cells and the clotting factors. *Id.*

because according to the patent, "[t]he detection rate is much higher using serum or plasma than using nucleated blood cell DNA extracted from a comparable volume of whole blood, suggesting there is enrichment of foetal DNA in maternal plasma and serum." '540 Patent at 1:55-58.

The three independent claims of the '540 patent are as follows:

> **1.** A method for detecting a paternally inherited nucleic acid of fetal origin performed on a maternal serum or plasma sample from a pregnant female, which method comprises amplifying a paternally inherited nucleic acid from the serum or plasma sample and detecting the presence of a paternally inherited nucleic acid of fetal origin in the sample.
>
> **24.** A method for detecting a paternally inherited nucleic acid on a maternal blood sample, which method comprises:
> removing all or substantially all nucleated and anucleated cell populations from the blood sample,
> amplifying a paternally inherited nucleic acid from the remaining fluid and subjecting the amplified nucleic acid to a test for the Paternally [sic] inherited fetal nucleic acid.
>
> **25.** A method for performing a prenatal diagnosis on a maternal blood sample, which method comprises
> obtaining a non-cellular fraction of the blood sample
> amplifying a paternally inherited nucleic acid from the non-cellular fraction and
> performing nucleic acid analysis on the amplified nucleic acid to detect paternally inherited fetal nucleic acid.

'540 Patent at 23:60-67; 26:20-36.

## 2. Procedural Background

Ariosa filed this declaratory relief action against Sequenom on December 19, 2011, seeking a declaration that its Harmony Test does not infringe any claims of the '540 patent.[2] Docket No. 1, Compl. On March 8, 2012, Sequenom filed an answer against Ariosa and a counterclaim for infringement of the '540 patent. Docket No. 33. On March 8, 2012, Sequenom also filed a motion for a preliminary injunction, seeking to enjoin Ariosa from making, using, selling, offering for sale, or importing into the United States the Harmony Prenatal Test. Docket No. 34.

On July 5, 2012, the Court denied Sequenom's motion for a preliminary injunction. Docket No. 121. In the order, the Court found that Ariosa had raised a substantial question with regard to the

[2] Two other cases have been filed in the Northern District of California which also seek declaratory judgments that specific products do not infringe the '540 patent and that the '540 patent is invalid. *See Natera, Inc. v. Sequenom, Inc.*, Case No. 12-cv-00132-SI (filed Jan. 6, 2012); *Verinata Health, Inc. v. Sequenom, Inc.*, Case No. 12-cv-865-SI (filed Feb. 22, 2012).

validity of the '540 patent based on Ariosa's argument that the '540 patent does not cover patent eligible subject matter. *Id.* at 16-19. Sequenom appealed the Court's denial of its motion for a preliminary injunction. Docket No. 123.

On August 9, 2013, the Federal Circuit vacated the Court's order denying the preliminary injunction and remanded the case for further proceedings. *Aria Diagnostics, Inc. v. Sequenom, Inc.*, 726 F.3d 1296, 2013 U.S. App. LEXIS 16506 (Fed. Cir. 2013). In vacating the order, the Federal Circuit rejected this Court's initial claim construction, but offered no opinion as to whether there is or is not a substantial question regarding the subject matter eligibility of the asserted claims of the '540 patent. *Id.* at *16-17. Rather, the Federal Circuit remanded with directions that this Court examine subject matter eligibility of the asserted claims in the first instance in light of the Supreme Court's recent decision in *Association for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107 (2013) and the Federal Circuit's claim construction holdings. *Id.* at *16.

By the present cross-motions for summary judgment, the parties move for summary adjudication of whether claims 1, 2, 4, 5, 8, 19-22, 24, and 25 of '540 patent are drawn to patent-eligible subject matter.

## LEGAL STANDARD

### 1. Summary Judgment

Summary judgment is proper "if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a). The moving party bears the initial burden of demonstrating the absence of a genuine issue of material fact. *Celotex Corp. v. Catrett*, 477 U.S. 317, 323 (1986). The moving party, however, has no burden to disprove matters on which the non-moving party will have the burden of proof at trial. The moving party need only demonstrate to the Court that there is an absence of evidence to support the non-moving party's case. *Id.* at 325.

Once the moving party has met its burden, the burden shifts to the nonmoving party to "set forth, by affidavit or as otherwise provided in Rule 56, 'specific facts showing that there is a genuine issue for trial.'" *T.W. Elec. Service, Inc. v. Pacific Elec. Contractors Ass'n*, 809 F.2d 626, 630 (9th Cir. 1987)

(citing *Celotex*, 477 U.S. at 324). To carry this burden, the non-moving party must "do more than simply show that there is some metaphysical doubt as to the material facts." *Matsushita Elec. Indus. Co., Ltd. v. Zenith Radio Corp.*, 475 U.S. 574, 586 (1986). "The mere existence of a scintilla of evidence . . . will be insufficient; there must be evidence on which the jury could reasonably find for the [non-moving party]." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 252 (1986).

In deciding a summary judgment motion, the Court must view the evidence in the light most favorable to the non-moving party and draw all justifiable inferences in its favor. *Id.* at 255. "Credibility determinations, the weighing of the evidence, and the drawing of legitimate inferences from the facts are jury functions, not those of a judge . . . ruling on a motion for summary judgment." *Id.* However, conclusory, speculative testimony in affidavits and moving papers is insufficient to raise genuine issues of fact and defeat summary judgment. *Thornhill Publ'g Co., Inc. v. GTE Corp.*, 594 F.2d 730, 738 (9th Cir. 1979). The evidence the parties present must be admissible. Fed. R. Civ. P. 56(c)(2).

**2. Subject Matter Eligibility Under § 101**

Under § 101 of the Patent Act, "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." 35 U.S.C. § 101. "In choosing such expansive terms . . . modified by the comprehensive 'any,' Congress plainly contemplated that the patent laws would be given wide scope." *Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980).

However, the Supreme Court has long held that there is an important exception to § 101: "'[L]aws of nature, natural phenomena, and abstract ideas' are not patentable." *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1293 (2012); *see also id.* ("[T]he [Supreme] Court has written that a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that $E=mc^2$; nor could Newton have patented the law of gravity. Such discoveries are manifestations of . . . nature, free to all men and reserved exclusively to none." (internal quotation marks omitted)). The Federal Circuit has explained that these exceptions should be applied narrowly. *Ultramercial, Inc. v. Hulu, LLC*, 722 F.3d 1335, 1342

(Fed. Cir. 2013); *see also Prometheus*, 132 S. Ct. at 1293 ("The Court has recognized . . . that too broad an interpretation of this exclusionary principle could eviscerate patent law. For all inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.").

Patent eligibility under § 101 is an issue of law that may involve underlying factual issues. *Accenture Global Servs. v. Guidewire Software, Inc.*, 2013 U.S. App. LEXIS 18446, at *10 (Fed. Cir. Sept. 5, 2013). Moreover, under 35 U.S.C. § 282, patents are presumed to be valid. Therefore, an alleged infringer must prove invalidity by clear and convincing evidence. *See Microsoft Corp. v. i4i L.P.*, 131 S. Ct. 2238, 2242 (2011); *see also Ultramercial*, 722 F.3d at 1339 (explaining that an accused infringer must prove ineligible subject matter under § 101 by clear and convincing evidence). In this connection, it is the factual evidence itself which must be clear and convincing. *See Buildex, Inc. v. Kason Indus., Inc.*, 849 F.2d 1461, 1463 (Fed. Cir. 1988) (clear and convincing evidence is evidence "which produces in the mind of the trier of fact an abiding conviction that the truth of [the] factual contentions are highly probable" (alteration in original) (citation and internal quotation marks omitted)).

**3. Supreme Court Case Law on Subject Matter Eligibility**

The Supreme Court has issued several recent decisions articulating standards for the subject matter eligibility, building on cases decided over the last half-century. Several of these cases are briefly reviewed below.

**A. *Funk Brothers***

The patent in *Funk Brothers* claimed an inoculant for leguminous plants comprising a plurality of selected mutually non-inhibitive strains of different species of bacteria of the genus Rhizobium, where the strains are unaffected by each other in respect to their ability to fix nitrogen in the leguminous plant for which they are specific.[3] *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 129 n.3

[3] Leguminous plants take nitrogen from the air and fix it in the plant for conversion to organic nitrogenous compounds. *Funk Bros.*, 333 U.S. at 129. The ability of these plants to fix nitrogen from the air depends on the presence of bacteria of the genus Rhizobium in the plant. *Id.* Bacteria of the genus Rhizobium fall into at least six species. *Id.* "No one species will infect the roots of all species of leguminous plants. But each will infect well-defined groups of those plants." *Id.*

(1948). The Supreme Court noted that prior to the invention, the general practice was to manufacture and sell inoculants containing only one of the six species of the Rhizobium bacteria, meaning that the inoculant could only be used successfully in plants that belonged to that specific species' inoculation group. *Id.* at 129. The inventors of the patent discovered that there are strains of each species of bacteria which do not exert a mutually inhibitive effect on each other, and, therefore, could be isolated and used in mixed cultures. *Id.* at 130. "Thus [the invention] provided a mixed culture of Rhizobia capable of inoculating the seeds of plants belonging to several cross-inoculation groups." *Id.*

The Supreme Court held that the claims were not patentable because "patents cannot issue for the discovery of the phenomena of nature." *Id.* at 130. The Supreme Court explained that discovery of the fact that certain strains of each species of these bacteria can be mixed without harmful effect to the properties of either is no more than the discovery of some of the handiwork of nature and hence is not patentable. *Id.* at 131. "If there is to be invention from such a discovery, it must come from the application of the law of nature to a new and useful end." *Id.* at 130. The Court recognized that the aggregation of select strains of the species of bacteria into one product is an application of a newly-discovered natural principle, but explained that the application of that principle "is hardly more than an advance in the packaging of the inoculants." *Id.* at 131; *see also id.* at 132 ("[O]nce nature's secret of the non-inhibitive quality of certain strains of the species of Rhizobium was discovered, the state of the art made the production of a mixed inoculant a simple step.").

**B. *Gottschalk v. Benson***

The patent application in *Benson* "claimed a method for converting binary-coded decimal (BCD) numerals into pure binary numerals." *Gottschalk v. Benson*, 409 U.S. 63, 64 (1972). The Supreme Court noted that "[t]he claims were not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use," and "[t]hey purported to cover any use of the claimed method in a general-purpose digital computer of any type." *Id.*; *see also id.* at 68 ("Here the 'process' claim is so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion").

The Supreme Court held that the claims were ineligible subject matter because the formula for

converting BCD numerals to pure binary numerals was an abstract idea. *See id.* at 71. The Court explained: "The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself." *Id.* at 71-72.

### C. *Parker v. Flook*

The patent application in *Flook* claimed a method of updating alarm limits,[4] consisting of three steps: "an initial step which merely measures the present value of the process variable (e.g., the temperature); an intermediate step which uses an algorithm to calculate an updated alarm-limit value; and a final step in which the actual alarm limit is adjusted to the updated value." *Parker v. Flook*, 437 U.S. 584, 585 (1978). The Court noted that "[t]he only difference between the conventional methods of changing alarm limits" and the claimed method "rests in the second step – the mathematical algorithm or formula." *Id.* at 585-86; *see also id.* at 588 (stating that because the patentee did not challenge the examiner's finding, the Court assumed that "the formula is the only novel feature of respondent's method").

The Supreme Court held that the application did not claim a patentable invention. *Id.* at 594. The Supreme Court explained that "[t]he only novel feature of the method is a mathematical formula," *id.* at 585, and the discovery of a phenomenon of nature or mathematical formula "cannot support a patent unless there is some other inventive concept in its application." *Id.* at 594. In addition, the Supreme Court rejected the patentee's argument that his invention was patentable because, unlike the patent in *Benson*, his invention did not wholly preempt the use of a mathematical formula. *See id.* at 589-95. The Court recognized that the invention did not wholly preempt the formula, but explained that

[4] "An 'alarm limit' is a number." *Parker v. Flook*, 437 U.S. 584, 585 (1978). During catalytic conversion processes (various processes used in the petrochemical and oil-refining industries), operating conditions such as temperature, pressure and flow rates are constantly monitored. *Id.* "When any of these 'process variables' exceeds a predetermined 'alarm limit,' an alarm may signal the presence of an abnormal condition indicating either inefficiency or perhaps danger. Fixed alarm limits may be appropriate for a steady operation, but during transient operating situations, such as start-up, it may be necessary to 'update' the alarm limits periodically." *Id.*

"'if a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory.'" *Id.* at 595 (quoting *In re Richman*, 563 F.2d 1026, 1030 (CCPA 1977)); *see also id.* at 590 ("The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance. A competent draftsman could attach some form of post-solution activity to almost any mathematical formula; the Pythagorean theorem would not have been patentable, or partially patentable, because a patent application contained a final step indicating that the formula, when solved, could be usefully applied to existing surveying techniques.").

**D. *Diamond v. Diehr***

The patent application in *Diehr* claimed "a process for molding raw, uncured synthetic rubber into cured precision products." *Diamond v. Diehr*, 450 U.S. 175, 177 (1981). The process involved constantly determining the actual temperature inside the mold, then automatically feeding the temperatures into a computer which would repetitively calculate the necessary cure time using a mathematical formula known as the Arrhenius equation, and opening the press whenever the elapsed cure time equaled the calculated necessary cure time. *See id.* at 178-79 & n.5.

The Supreme Court found the invention to be patentable. The Court held that "a physical and chemical process for molding precision synthetic rubber products falls within the § 101 categories of possibly patentable subject matter." *Id.* at 184. The Court distinguished the invention at issue from the inventions found unpatentable in *Benson* and *Flook*. *See id.* at 185-88, 191-92 & n.14. The Court recognized that "the process admittedly employs a well-known mathematical equation, but [the patentees] do not seek to pre-empt the use of that equation. Rather, they seek only to foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process." *Id.* at 187. "[W]hen a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e. g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101." *Id.* at 192. In addition, unlike in *Flook*, the patentees contended that there were novel aspects of the invention other than the use of the mathematical formula.

*See id.* at 178-79.

**E. *Bilski v. Kappos***

The patent application in *Bilski* claimed a procedure for instructing buyers and sellers of commodities in the energy market how to protect against the risk of price fluctuations in those commodities. *Bilski v. Kappos*, 130 S. Ct. 3218, 3223 (2010). "Claim 1 describes a series of steps instructing how to hedge risk. Claim 4 puts the concept articulated in claim 1 into a simple mathematical formula. . . . The remaining claims explain how claims 1 and 4 can be applied to allow energy suppliers and consumers to minimize the risks resulting from fluctuations in market demand for energy." *Id.* at 3223-24.

The Supreme Court held that the claims were unpatentable under *Benson*, *Flook*, and *Diehr* because the claims "are attempts to patent abstract ideas." *Id.* at 3230. The Court explained that claims 1 and 4 in the patentees' application explain the basic concept of hedging, or protecting against risk, and the concept of hedging is an unpatentable abstract idea. *Id.* at 3231. "Allowing petitioners to patent risk hedging would preempt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea." *Id.* The Court also rejected the remaining claims of the application because they were "broad examples of how hedging can be used in commodities and energy markets." *Id.* "*Flook* established that limiting an abstract idea to one field of use or adding token postsolution components d[o] not make the concept patentable." *Id.*

**F. *Mayo v. Prometheus***

The patents in *Prometheus* claimed processes that help doctors using thiopurine drugs to treat patients with autoimmune diseases determine whether a given dosage level is too low or too high. *Prometheus*, 132 S. Ct. at 1294. Too high a dosage would risk harmful side effects, but too low a dosage might be ineffective. *Id.* at 1295. At the time of the invention, scientists already understood that the levels of certain metabolites in a patient's blood were correlated with the likelihood that a particular dosage of a thiopurine drug could cause harm or prove ineffective. *Id.* The patents' claims set forth processes embodying researchers' findings that identified the precise correlations between metabolite

levels and likely harm or ineffectiveness. *Id.*

The Supreme Court held that the claims were invalid under § 101. *Id.* at 1305. The Court explained that "Prometheus' patents set forth laws of nature – namely, relationships between concentrations of certain metabolites in the blood and the likelihood that a dosage of a thiopurine drug will prove ineffective or cause harm." *Id.* at 1296. "If a law of nature is not patentable, then neither is a process reciting a law of nature, unless that process has additional features that provide practical assurance that the process is more than a drafting effort designed to monopolize the law of nature itself. A patent, for example, could not simply recite a law of nature and then add the instruction 'apply the law.'" *Id.* at 1297. Therefore, the Court concluded that although the patents recited additional steps in addition to the law of nature, the additional steps were insufficient to transform the character of the claims. *See id.* at 1297-98 ("[T]he claims inform a relevant audience about certain laws of nature; any additional steps consist of well understood, routine, conventional activity already engaged in by the scientific community; and those steps, when viewed as a whole, add nothing significant beyond the sum of their parts taken separately.").

### G. *Ass'n for Molecular Pathology v. Myriad*

The patentees in *Myriad* discovered the precise location and sequence of two human genes, the BRCA1 and BRCA2 genes, mutations of which can substantially increase the risks of breast and ovarian cancer, and obtained several patents based on that discovery. *Myriad*, 133 S. Ct. at 2110-11. The claims at issue gave Myriad "the exclusive right to isolate an individual's BRCA1 and BRCA2 genes . . . by breaking the covalent bonds that connect the DNA to the rest of the individual's genome. The patents [also gave] Myriad the exclusive right to synthetically create BRCA cDNA [("complementary DNA")]." *Id.* at 2113.

The Supreme Court held that "a naturally occurring DNA segment is a product of nature and not patent eligible merely because it has been isolated, but that cDNA is patent eligible because it is not naturally occurring." *Id.* at 2111. The Court noted that Myriad did not create or alter any of the genetic information encoded in the BRCA1 and BRCA2 genes and did not create or alter the genetic structure of DNA. *Id.* at 2116. "Instead, Myriad's principal contribution was uncovering the precise location and

genetic sequence of the BRCA1 and BRCA2 genes within chromosomes 17 and 13." *Id.* "To be sure, [Myriad] found an important and useful gene, but separating that gene from its surrounding genetic material is not an act of invention." *Id.* at 2117. In contrast, the Court found that cDNA is not a "product of nature" and, therefore, is patent eligible under § 101. *Id.* at 2119.

**DISCUSSION**

Ariosa argues that claims 1, 2, 4, 5, 8, 19-22, 24, and 25 of the '540 patent are not drawn to patent eligible subject matter because paternally inherited cffDNA is a natural phenomenon and the claims of the '540 patent merely add well-understood, routine, conventional activity in the field to that natural phenomenon. Docket No. 219 at 7-20. In response, Sequenom argues that the claimed methods are patentable because they are novel uses of a natural phenomenon, rather than a patent on the natural phenomenon itself. Docket No. 223 at 7-18. In addition, Sequenom argues that the claims are patentable because the claims do not preempt all uses of cffDNA. *Id.* at 18-22.

The parties agree that neither cffDNA nor the discovery of cffDNA in maternal plasma or serum is patentable, because the presence of cffDNA in maternal plasma or serum is a natural phenomenon. Docket No. 219 at 1-2; Docket No. 223 at 1, 8; *see Myriad*, 133 S. Ct. at 2116; *Prometheus*, 132 S. Ct. at 1293; *see also Funk Bros.*, 333 U.S. at 130 ("He who discovers a hitherto unknown phenomenon of nature has no claim to a monopoly of it which the law recognizes."). This is true even if the discovery of cffDNA in maternal plasma or serum was considered groundbreaking, innovative, and brilliant. *See Myriad*, 133 S. Ct. at 2117. However, the '540 patent does not claim as an invention the discovery of cffDNA in maternal plasma or serum. The '540 patent claims methods of detecting paternally inherited cffDNA in maternal plasma or serum. *See* '540 Patent at 2:1-5, 23:60-26:40. Therefore, the issue before the Court is whether the steps of the claimed methods in the '540 patent, applied to that natural phenomenon, are sufficient to render the claims patentable. *See Prometheus*, 132 S. Ct. at 1297 ("[D]o the patent claims add enough to their statements of the correlations to allow the processes they describe to qualify as patent eligible processes that apply natural laws").

A process or method is not unpatentable simply because it contains a law of nature, a natural phenomenon, or an abstract idea. *Prometheus*, 132 S. Ct. at 1293; *Flook*, 437 U.S. at 590. But, to be

patentable, a process that focuses upon the use of a natural law, a natural phenomenon, or an abstract idea must contain other elements or a combination of elements, sometimes referred to as an "inventive concept," sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the natural law, natural phenomenon, or abstract idea itself. *Prometheus*, 132 S. Ct. at 1294; *see also Flook*, 437 U.S. at 594 ("[T]he discovery of such a phenomenon cannot support a patent unless there is some other inventive concept in its application."). In other words, the claimed process – apart from the natural law, natural phenomenon, or abstract idea – must involve more than "well-understood, routine, conventional activity," previously engaged in by those in the field. *Prometheus*, 132 S. Ct. at 1294, 1299; *see also id.* at 1300 ("[S]imply appending conventional steps, specified at a high level of generality, to laws of nature, natural phenomena, and abstract ideas cannot make those laws, phenomena, and ideas patentable."); *Myriad*, 133 S. Ct. at 2119-20 (explaining that an innovative method of manipulating a natural phenomenon – as opposed to applying a well-understood process in the field – would be patentable).

Here, Ariosa argues that the method steps contained in claims 1, 2, 4, 5, 8, 19-22, 24, and 25 of the '540 patent do not add enough to the natural phenomenon of paternally inherited cffDNA to make these claims patentable under § 101. Docket No. 219 at 10-20. Specifically, Ariosa argues that the additional limitations in the claims either apply well-understood, routine, and conventional activity to the natural phenomenon or limit the natural phenomenon to specific types of the natural phenomenon, which are also unpatentable. *See id.* The Court agrees. For example, claim 1 of the '540 patent claims a method for detecting cffDNA, comprising the following two steps: "amplifying a paternally inherited nucleic acid from the serum or plasma sample [from a pregnant female] and detecting the presence of a paternally inherited nucleic acid of fetal origin in the sample." '540 Patent at 23:64-67. Ariosa has presented the Court with evidence, including the specification and prosecution history of the '540 patent and testimony by Sequenom's own expert, Dr. Evans, stating that the amplification and detection of DNA sequences in plasma or serum was well known by 1997. Docket No. 219 at 10-14 (citing evidence); Docket No. 238 at 6-7 (citing evidence). For example, the specification of the '540 patent states that "[t]he preparation of serum of plasma from the maternal blood sample is carried out by standard techniques" and also states "[s]tandard nucleic acid amplification systems can be used." '540

Patent at 2:26-27, 2:44-45; *see also* Docket No. 219-7, Gindler Decl. Ex. 5 ¶ 7. In addition, the inventors during the prosecution history stated that any of the well-known, routine techniques for detection of DNA could be used to detect fetal DNA in maternal serum or plasma. Docket No. 219-4, Gindler Decl. Ex. 2 at 5, 7-8, 10, 12; *see also* '540 Patent at 1:38-43. Sequenom's expert Dr. Evans acknowledged that traditional DNA diagnostics, prior to the invention, commonly involved sample preparation, amplification, and detection. Docket No. 219-6, Gindler Decl. Ex. 4 at 188:5-13; *see also id.* at 150:18-151:7, 152:4-15. Dr. Evans also acknowledged that others before the inventors had amplified and detected nucleic acid in plasma or serum. *Id.* at 188:15-17; Docket No. 35, Evans Decl. ¶ 58; *see also* Docket No. 238-7, Gindler Decl. Ex. 16 at 485 ("There has been much interest in the use of DNA derived from plasma or serum for molecular diagnosis."). Sequenom does not contest that these steps and other steps in the patent[5] were well-understood, routine, and conventional activity by those in the field at the time of the invention. Indeed, in its reply brief and at oral argument, Sequenom acknowledges that the claims of the '540 patent merely apply "conventional techniques" to the newly discovered natural phenomenon of cffDNA. Docket No. 240 at 7 ("Just like Myriad's claim 21, the '540 patent's claims apply conventional techniques to use a newly-isolated natural phenomenon for diagnostic purposes."); Docket No. 253 at 19:7-10 ("The inventive concept was to take a known method and to look at [it] in a place where people were – where the Federal Circuit and all the experts agree

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[5] Dependent Claims 2 and 4 respectively add the limitations of requiring the use of the polymerase chain reaction ("PCR") and the use of a sequence specific probe. *See* '540 Patent at 24:60-61, 24:65-67. Ariosa has presented the Court with evidence that these two techniques were well-understood, routine, conventional activity engaged in by those in the field at the time of the invention. *See id.* at 2:44-45, 5:7-10, 6:42-7:10, 9:62-63, 10:5-7; Docket No. 35, Evans Decl. ¶ 42.

Dependent Claims 5, 8, 19, and 20 merely limit the natural phenomenon of paternally inherited cffDNA to specific types of that natural phenomenon, such as requiring that the cffDNA is from a Y chromosome or requiring that the cffDNA is at least a certain percentage of the total DNA. *See* '540 Patent at 25:1-3, 25:8-10, 25:39-26:3. A specific type of a natural phenomenon is still a natural phenomenon and, thus, is not patentable. *See Myriad*, 133 S. Ct. at 2116; *Prometheus*, 132 S. Ct. at 1293.

Dependent claims 21 and 22 add the limitations of fractionating the blood sample and providing a diagnosis based on the cffDNA. *See id.* at 26:4-26:16. Independent claims 24 and 25 contain – in addition to the limitations in claim 1 – limitations related to fractionating a blood sample. *See id.* at 26:20-36. Ariosa has presented the Court with evidence that fractionating blood and providing a diagnosis based on fetal DNA were well-understood, routine, conventional activity engaged in by those in the field at the time of the invention. *See id.* at 2:26-27; Docket No. 219-2, Gindler Decl. Ex. 3 at 6, Ex. 4 at 152:4-15, Ex. 5 ¶ 7.

were throwing waste away, to look there . . ."), 21:19-21 ("I don't disagree that if you go through all the elements in the claim you could put a check as either a conventional item or a natural phenomenon."), 37:20-22, 38:25-39:1 ("They used conventional tools to make it useful to other people."). Because the claimed processes at issue – apart from the natural phenomenon of paternally inherited cffDNA – involve no more than well-understood, routine, conventional activity, previously engaged in by those in the field, they are not drawn to patent eligible subject matter and are invalid under § 101. *See Prometheus*, 132 S. Ct. at 1294, 1299-1300; *Myriad*, 133 S. Ct. at 2119-20.

Sequenom argues that the claims are patentable because although cffDNA is not patentable, the use of cffDNA is patent eligible. Docket No. 223 at 7-10. The Court disagrees. The Supreme Court has never stated that any use of a natural phenomenon is patentable. To the contrary, the Supreme Court has held that "simply appending conventional steps, specified at a high level of generality, to laws of nature, natural phenomena, and abstract ideas cannot make those laws, phenomena, and ideas patentable." *Prometheus*, 132 S. Ct. at 1300. It is only an innovative or inventive use of a natural phenomenon that is afforded patent protection. *See Myriad*, 133 S. Ct. at 2119 ("Had Myriad created an innovative method of manipulating genes while searching for the BRCA1 and BRCA2 genes, it could possibly have sought a method patent."); *Flook*, 437 U.S. at 594 ("[A]n inventive application of the principle may be patented."). Sequenom attempts to argue that its patent claims an inventive method of using cffDNA. But, based on the undisputed facts before the Court, the only inventive part of the patent is that the conventional techniques of DNA detection known at the time of the invention are applied to paternally inherited cffDNA as opposed to other types of DNA. Thus, the only inventive concept contained in the patent is the discovery of cffDNA, which is not patentable.

The Court's conclusion conforms with the relevant Supreme Court case law, in particular *Flook* and *Myriad*. The patent in *Flook*, like the present patent, claimed methods that utilized an abstract idea or a natural phenomenon – a mathematical algorithm in *Flook*, paternally inherited cffDNA in the present case.[6] *See* 437 U.S. at 585. In *Flook*, as in here, the use of the abstract idea or the natural

[6] The Court recognizes that the claims in *Flook* utilized an abstract idea, while the present claims utilize a natural phenomenon. However, the Supreme Court has never drawn a distinction between natural phenomena, laws of nature, and abstract ideas in determining patent eligibility. To the contrary,

phenomenon is the only inventive feature of the claims. *See id.* at 588. In *Flook*, the Supreme Court noted "the only difference between the conventional methods of changing alarm limits and that described in respondent's application rests in the second step – the mathematical algorithm or formula." *Id.* at 585-86. Similarly, based on the undisputed facts, the only difference between the conventional methods of DNA detection and that described in the '540 patent rests in the application of the methods to paternally inherited cffDNA, a natural phenomenon. Sequenom argues that its use of cffDNA is inventive because prior to the invention, no one had started with the mother's plasma or serum to detect paternally inherited fetal DNA. Docket No. 223 at 7, 16. Even assuming this true, the same argument could be made for the claims in *Flook*. Prior to the invention in *Flook*, no one had used that particular mathematical formula to update alarm limits. Despite this, the Supreme Court held that the claims in *Flook* were not drawn to patent eligible subject matter. Thus, use of a newly discovered natural phenomenon, law of nature, or abstract idea will not render a claim patentable if the use of that natural phenomenon, law of nature or abstract idea is the only innovation contained in the patent. *See Flook*, 437 U.S. at 594 ("[T]he discovery of such a phenomenon cannot support a patent unless there is some other inventive concept in its application."); *Prometheus*, 132 S. Ct. at 1294, 1299 (requiring that claims – apart from the natural phenomenon – contain more than well-understood, routine, conventional activity); *Funk Bros.*, 333 U.S. at 131 ("[H]owever ingenious the discovery of that natural principle may have been, the application of it is hardly more than an advance in the packaging of the inoculants."). As explained in *Flook*, "the Pythagorean theorem would not have been patentable, or partially patentable, because a patent application contained a final step indicating that the formula, when solved, could be usefully applied to existing surveying techniques." 437 U.S. at 590. The Court similarly concludes that paternally inherited cffDNA is not patentable simply because the claims contain steps indicating that it may be detected using existing DNA detection methods.

Further, even though *Myriad* involved composition claims rather than method claims, that decision also supports the Court's conclusion. The claims in *Myriad* gave the patentees the exclusive

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the Supreme Court has applied its § 101 jurisprudence uniformly regardless of whether the claims at issue involved a natural phenomenon, law of nature, or abstract idea. *See, e.g., Myriad*, 133 S. Ct. 2116-20 (natural phenomenon); *Prometheus*, 132 S. Ct. at 1293-1302 (law of nature); *Bilski*, 130 S. Ct. at 3229-31 (abstract idea).

right to isolate the BRCA1 and BCRA2 genes. *See* 133 S. Ct. at 2113. Although the Supreme Court was not presented with method claims, the Court explained "[h]ad Myriad created an innovative method of manipulating genes while searching for the BRCA1 and BRCA2 genes, it could possibly have sought a method patent. But the processes used by Myriad to isolate DNA were well understood by geneticists at the time of Myriad's patents . . . ."[7] *Id.* at 2119-20. Similarly, had the inventors of the '540 patent created an innovative method of performing DNA detection while searching for paternally inherited cffDNA, such as a new method of amplification or fractionation, those claims would be patentable. But, the claims presently before the Court simply rely on processes to detect DNA that – as Sequenom concedes – were conventional techniques by those in the field at the time of the invention. Docket No. 240 at 7; Docket No. 253 at 19:7-10, 21:19-121, 37:20-22, 38:25-39:1.[8]

Sequenom cautions that the Court should not engage in a step-by-step dismantling of the claims. Docket No. 223 at 22-24 (citing *Diehr*, 450 U.S. at 188 ("In determining the eligibility of respondents' claimed process for patent protection under § 101, their claims must be considered as a whole. It is inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old

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[7] The Supreme Court drew this distinction even though Myriad was the first to use those well-understood processes to isolate the BRCA1 and BRCA2 genes. *See Myriad*, 133 S. Ct. at 2112-13. Therefore, *Myriad* also supports the principle that the use of a newly discovered natural phenomenon, law of nature, or abstract idea will not render a claim patentable if the use of that natural phenomenon, law of nature or abstract idea is the only innovation contained in the patent.

[8] The Court rejects Sequenom's argument that *Myriad* supports the patentability of the '540 patent's claims because the Supreme Court implicitly approved of claim 21 of Myriad's patent. *See* Docket No. 223 at 12; Docket No. 240 at 6-7. In *Myriad*, the Supreme Court endorsed the statement in Judge Bryson's Federal Circuit dissent that "'[a]s the first party with knowledge of the [BRCA1 and BRCA2] sequences, Myriad was in an excellent position to claim applications of that knowledge. Many of its unchallenged claims are limited to such applications.'" 133 S. Ct. at 2120. In his dissent, Judge Bryson cited to claim 21 as an example of such an application. However, the Supreme Court did not refer to claim 21, or any other method claims, as an example of that principle. *See id.* Moreover, although Sequenom argues that claim 21 merely applied the conventional steps of hybridizing and detecting with probes the BRCA1 gene, Docket No. 223 at 12, Sequenom has not presented this Court with any evidence showing that hybridizing and detecting a gene with probes was conventional activity at the time of that invention.

In addition, the Court rejects Sequenom's argument that *Myriad*'s holding that cDNA is patent eligible supports the patentability of the claims of the '540 patent. Docket No. 223 at 11; Docket No. 240 at 5. In *Myriad*, the Supreme Court held that cDNA was patent eligible because it was not a naturally occurring phenomenon. 133 S. Ct. at 2119. Here, Sequenom has failed to provide any evidence or argument stating that the methods claimed in the '540 patent produce a non-naturally occurring phenomenon. To the contrary, Sequenom concedes that cffDNA is a naturally occuring phenomenon. *See* Docket No. 223 at 1, 8.

elements in the analysis. This is particularly true in a process claim because a new combination of steps in a process may be patentable even though all the constituents of the combination were well known and in common use before the combination was made."); *Ultramercial*, 722 F.3d at 1344)). In evaluating the patentability of the claims, the Court has not dissected the claims into their individual limitations and then determined whether the individual elements are old or new. Rather, the Court has considered the claimed processes as a whole. The unrebutted evidence does not merely show that the individual steps of fractionation, amplification and detection were well-understood, routine, and conventional activity at the time of the invention. The evidence shows that its was well-understood, routine, and conventional activity to combine these steps to detect DNA in serum or plasma. *See* '540 Patent at 1:19-43; Docket No. 35, Evans Decl. ¶ 58; Docket No. 219-6, Gindler Decl. Ex. 4 at 188:5-13, 188:15-17; Docket No. 238-7, Gindler Decl. Ex. 16 at 485. Therefore, looking at the claimed processes as a whole, the only inventive component of the processes in the '540 patent is to apply those well-understood, routine processes to paternally inherited cffDNA, a natural phenomenon.

In addition, in determining whether a claim is patentable, a court should consider whether the claim poses a risk of preempting a law of nature, natural phenomenon, or abstract idea.[9] *See Accenture*, 2013 U.S. App. LEXIS 18446, at *10-11; *CLS Bank Int'l v. Alice Corp. Pty*, 717 F.3d 1269, 1280-82 (Fed. Cir. 2013) (en banc) (Lourie, J., concurring); *see also Prometheus*, 132 S. Ct. at 1294 (Supreme Court case law "warn[s] against upholding patents that claim processes that too broadly preempt the use of a natural law."); *Diehr*, 450 U.S. at 187 (noting that the claims did not preempt use of the equation). Sequenom argues that the claims of the '540 patent do not preempt all other uses of cffDNA. Docket

[9] Although the Court agrees that preemption is a consideration when performing a § 101 analysis, the Court disagrees with Sequenom that whether the claims preempt all uses of the natural phenomenon is dispositive of the analysis. *See* Docket No. 223 at 2, 20. In *Flook*, the Supreme Court held that the claims were drawn to ineligible subject matter even though the Supreme Court conceded that the claims did not wholly preempt the mathematical formula at issue. *See* 437 U.S. at 589-90. In *Bilski*, the Supreme Court held that the dependent claims at issue were drawn to ineligible subject matter even though they were limited to how the abstract idea of hedging could be used in commodities and energy markets and, thus, would not preempt use of the abstract idea in other fields. *See* 130 S. Ct. at 3231. *Flook* and *Bilski* have not been overruled and remain good precedent. *See also Ultramercial*, 722 F.3d at 1346 ("[T]he Supreme Court has stated that, even if a claim does not wholly pre-empt an abstract idea, it still will not be limited meaningfully if it contains only insignificant or token pre- or post-solution activity – such as identifying a relevant audience, a category of use, field of use, or technological environment.").

No. 223 at 20. In support of this argument, Sequenom has presented the Court with scientific articles describing methods for detecting cffDNA. Docket No. 223-1, Root Decl. Ex. A at A1875, A2011-12, A2102-05, A2273-80, Ex. F. Ariosa argues that even if these articles disclose alternative methods of detecting cffDNA, Sequenom has failed to present any evidence showing that any of these alternative methods are practical and commercially viable. Docket No. 238 at 17 n.3. In response, Sequenom argues that it is only relevant that the alternative methods can be practiced, not that they are commercially viable alternatives. Docket No. 240 at 14-15. The Court disagrees. If the alternative methods are not commercially viable, then the effect of the patent in practice would be to preempt all uses of the natural phenomenon. It is important to note that the '540 patent does not merely claim uses or applications of cffDNA, it claims methods for detecting the natural phenomenon. Because generally one must be able to find a natural phenomenon to use it and apply it, claims covering the only commercially viable way of detecting that phenomenon do carry a substantial risk of preempting all practical uses of it. It is also important to note the age of the patent. The '540 patent was issued in July 2001. That twelve years have passed since the issuance of the patent but Sequenom does not present the Court with any evidence of a commercially viable alternative method of detecting cffDNA reflects the broad scope of the '540 patent's claims and the great risk that the patent could preempt the use of cffDNA. Indeed, Sequenom itself has acknowledged the preemptive effect of its patent. *See* Docket No. 238-1, Gindler Decl Ex. 11 at 2 ("'[M]anagement believes that the in-licensed '540 patent . . . will block all non-invasive cell-free DNA-based approaches.'"), Ex. 12 at 6 ("[W]e believe [the '540 patent] is the underpinnings of this whole field, and potentially believe anybody whose [*sic*] developing, an approach that interrogates the circulating cell [free] DNA is infringing this key patent in the field.")

Further, the articles cited by Sequenom were published after the issuance of the patent and well after the date of the invention. *See* Docket No. 223-1, Root Decl. Ex. A at A2102-05 (2003), A2273-80 (2012), Ex. F (2002). Therefore, even assuming that the articles disclose alternative methods of detecting cffDNA, Sequenom has failed to show that any alternative methods existed at the time of the invention or at the time of issuance of the patent. Thus, it appears that the effect of issuing the '540 patent was to wholly preempt all known methods of detecting cffDNA at that time. Accordingly, the Court concludes that the claims at issue pose a substantial risk of preempting the natural phenomenon

of paternally inherited cffDNA and that the preemption inquiry supports the Court's conclusion that the claims are not drawn to patent eligible subject matter.

In sum, the Court concludes that, based on the undisputed facts before the Court, Ariosa has met its burden of proving by clear and convincing evidence that claims 1, 2, 4, 5, 8, 19-22, 24, and 25 of the '540 patent are not drawn to patent eligible subject matter and are invalid under 35 U.S.C. § 101.

## CONCLUSION

For the foregoing reasons, the Court GRANTS Ariosa's motion for summary judgment and DENIES Sequenom's motion for summary judgment. Docket Nos. 219, 223.

**IT IS SO ORDERED.**

Dated: October 30, 2013

SUSAN ILLSTON
United States District Judge